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The comparison of preperitoneal and Lichtenstein repair for incarcerated groin hernias: A randomised controlled trial

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ABSTRACT

Background: Lichtenstein hernioplasty can be performed successfully as an emergency operation for incarcerated inguinal hernia. The aim of the study was to compare the short-term and long-term outcomes of the preperitoneal mesh with the Lichtenstein mesh technique in strangula groin hernia.

Methods: Forty consecutive patients with strangulated inguinal hernia were randomized (according to a random table) to undergo either a preperitoneal or a Lichtenstein repair under general anesthesia. Early outcome measures were age, gender, duration of surgery, operating time (min), side of hernia, other pathology, contents of hernia sac, the ratio of the bowel resection, required laparotomy, complete release of the intestinal loop and postoperative complications, time to return to work, driving and full activity. Long-term outcome measures were recurrence. A Student's t-test and Chi-square analysis were used for statistical analysis.

Results: They were randomly allocated to undergo either a preperitoneal mesh repair ($n = 19$) or a tension-free mesh repair Lichtenstein ($n = 21$). There were no persistent complications. Mean duration of surgery in the preperitoneal group was 54 min (SD = 11) versus 50 min in the Lichtenstein group (SD = 8). There was no significant difference with regards to age, race, gender, or comorbidities between the 2 groups. Four of the 21 patients (10.5%) who required an additional incision developed some type of complication. This circumstance was found to have significant influence on morbidity ($P = 0.003$) but not on mortality. The median follow-up for the study was 24 months. Patients were seen 1 to 2 weeks after surgery.

Conclusions: In conclusion we recommend preperitoneal repair in strangulated hernia instead of Lichtenstein repair. The use of preperitoneal hernia repair for strangulated inguinal hernia is safe, and any need for laparotomy if bowel resection is necessary.

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1. Introduction

Anterior abdominal wall hernia occurring with strangulation is a serious surgical emergency, as it is associated with high morbidity and mortality. Approximately 10% of inguinal

hernias and 20% of femoral hernias present acutely incarcerated. The optimal technique for strangulated inguinal hernia repair remains contentious. The traditional approach for incarcerated hernia is inguinal. The Lichtenstein mesh technique has revolutionized hernia surgery in prompting a shift

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away from traditional sutured repairs towards tension-free methods and this is the most commonly carried out herniorrhaphy technique now. However, this has several limitations: dissection of the cord structures is difficult, and repair of the hernia sac is not easy if torn at the level of the deep inguinal ring. Furthermore, inspection of the hernia sac contents, resection, and anastomosis if necessary, is difficult.

The aim of this study was to present the results of preperitoneal and Lichtenstein repairs for strangulated groin hernias in our institution, using randomized clinical trial.

2. Subjects and methods

2.1. Patients

From September 1999 to February 2007, a total of 40 consecutive patients with strangulated inguinal hernia underwent Lichtenstein or preperitoneal hernia repair. The patients' data were collected prospectively. Patients were selected according to the number on the random table for 2 different extensions of surgical procedures. Inguinal hernia repairs were performed by the same experienced surgeons. Strangulation was defined by failure of manual reduction of an inguinal hernia. The patients were divided into 2 groups according to the surgical procedure performed: preperitoneal repair (Group I, $n = 19$) and Lichtenstein hernia repair (Group II, $n = 20$). The exclusion criteria were as follows: bilateral inguinal hernia, connective tissue diseases, immunocompromised host, and the use of aspirin or other nonsteroidal anti-inflammatory drugs. All the patients were routinely given a single shot of intravenous antibiotic prophylactic with cefazoline 2 g. In patients where resection of nonviable bowel had been performed, intravenous antibiotics were continued until the 4th postoperative day.

Those with strangulated hernia were analyzed in respect of age, gender, operating time (min), side of hernia, other pathology, contents of hernia sac, the ratio of the bowel resection, required laparotomy, complete release of the intestinal loop and postoperative complications. The length of postoperative hospital stay and postoperative complications were recorded. Wound complications included seroma, hematoma, and wound infection.

The study plan was reviewed and approved by our institutional ethical committee, and informed consent was obtained from all patients.

2.2. Operative technique

The operation site was painted with povidone-iodine. All patients were operated upon under general anesthesia.

2.2.1. Preperitoneal mesh repair

The incision was a 2.5–4-cm skin crease, one centered 2 cm above the midinguinal point. The anterior rectus sheath and the oblique muscles were incised for the length of the skin incision. The lower flap of these structures was retracted inferiorly towards the pubis. The transversalis fascia was then incised along the lateral edge of the rectus muscle and the preperitoneal space entered. Transversalis fascia was incised to

expose the hernia sac. The peritoneum at the neck of the sac was opened, and hernia contents were delivered, inspected, and reduced. The peritoneum was closed after dissection of the vas and vessels off the hernia sac. The distal part of the sac was left undisturbed. If reduction of the hernia contents was difficult, then the inguinal canal was exposed by blunt dissection superficial to the external oblique aponeurosis. The canal was opened by dividing the external inguinal ring. Contents were reduced by pushing on the hernia sac and pulling the contents from within the peritoneal cavity. When necessary, bowel resection was done from this area. The next step was the placement of the prosthesis. A mesh prosthesis (Prolene mesh Ethicon Company) with minimum size of 15×10 cm for an adult was approximately the distance between the umbilicus and the anterior superior iliac spine – 1 cm for the width. After the spread of mesh prosthesis, layers were closed anatomically.

2.2.2. Lichtenstein mesh onlay repair

The Lichtenstein mesh repair was performed as previously described by Amid et al.¹ Briefly, the inguinal canal was approached from an open anterior approach after dividing the skin, Scarpa's fascia, and the external oblique aponeurosis. The cord was examined for a strangulated hernia sac and a sac was opened to examine the vitality of the hernia contents and the floor was reinforced with a piece of flat polypropylene mesh that was sewn to the conjoint tendon and the shelving edge of the inguinal ligament. The mesh was slit to accommodate the cord structures.

2.2.3. Statistical analysis

Data were analyzed using SPSS 12.0 for Windows. Data are presented as mean \pm standard error of the mean. Univariate comparisons were made by using an unpaired Student's *t*-test and Chi-square analysis. *P*-values of less than 0.05 were regarded as significant.

3. Results

3.1. Preoperative evaluation

The present study included 40 patients. Preperitoneal hernioplasty (Group I) was performed in 19 patients with average age of 63 years ($SD = 20.1$) including 4 cases of recurrent herniations. This group consisted of 14 men (average age 57.8 years; $SD = 19.9$) and 5 women (average age 79.6 years; $SD = 9.2$). There were 13 cases of the omental incarceration and 6 cases of the intestine strangulation. Two of the 6 patients had resection of the small intestine, and 5 of the 13 patients required resection of necrotic omentum. The strangulated intestinal loop or omentum was released in only 19 cases during the operation (Table 1).

In Group II including 21 patients with an average age of 60 years ($SD = 17.7$) underwent the Lichtenstein procedure for strangulated inguinal hernias. Implantation of polypropylene monofilament mesh was performed in 17 men with the mean age of 63.1 years ($SD = 18.2$) and 4 women with the mean age of 65.5 years ($SD = 14.8$). There were 18 cases of primary hernias and 3 cases of recurrent hernia among them. During

Table 1 – Patient demographics and type of hernia

Strangulated hernia (n = 40)	Group I (n = 17)	Group II (n = 21)	P-value
Age (years)	63 ± 20.1	60 ± 17.7	NS
Male/female	14:5	17:4	NS
Primary/recurrent hernia	15:4	18:3	NS
Omental/intestinal strangulation	13:6	9:12	NS
Mean hospital stay	2.6 (1–9)	2.4 (2–6)	NS
Second incision requirement	2:0	5:4	0.01

the operation the strangulated intestinal loop was released in 12 patients and a small intestinal resection was performed in 5 cases because of the segmental necrosis. In 4 of the 5 patients (80%) an additional midline incision for bowel evaluation and resection was required. The incarcerated omentum was released in 9 cases, and its necrotic fragments were resected in 2 cases.

The patients in Group I had a mean hospital stay of 2.6 days (range, 1–9 days) for those without resection and 6 days (range, 4–8 days) for those with resection.

In Group II, the postoperative hospital stay ranged from 2 to 6 days with a mean of 2.4 days. The 2 patients in whom resection–anastomosis was discharged on the 6th postoperative day. The difference in postoperative hospital stay was statistically insignificant ($P > 0.5$).

The difference in the mean ages of both groups was statistically insignificant ($P > 0.743$). In Group I, 1 patient (4%) developed a scrotal hematoma following the dissection of a large recurrent inguinoscrotal hernia. This hematoma was managed conservatively. No other postoperative complications were encountered, whether related or unrelated to the presence of the mesh. No complications were encountered in Group II patients.

In Group I, the follow-up duration ranged from 6 to 72 months with a mean of 24 months, while in Group II it ranged from 6 to 70 months with a mean of 23 months. The difference in the follow-up duration was statistically insignificant ($P > 0.826$).

3.1.1. Recurrence and surgical performance

Considering all the series, there were postoperative complications in 2 cases (5%). The most frequent serious complications were pulmonary diseases in 1 patients (50%) and cardiovascular disorders in 1 patients (50%). Throughout the study period, there were no complications related to the presence of the mesh, no mesh had to be removed, and no recurrences were encountered in either group.

4. Discussion

The incidence of strangulated hernia varies significantly in different parts of the world. It is associated with a 10-fold increase in mortality and very frequent or the most common cause of mechanical ileus in some countries. Strangulation occurs in 5–42% of all small bowel obstructions. The most frequently incarcerated viscera were, in decreasing frequency, small intestine, omentum, and colon. The diagnosis is usually

easier in incarcerated inguinal hernias than in femoral ones, but there is not any useful connection between clinical findings and bowel viability, since the definitive diagnosis of strangulation can be made only at the time of surgical exploration. As an emergency presentation, irreducibility or incarceration occurs when the protrusion can no longer be returned because the hernial content is plugging the defect. The viscus may become strangulated if the blood supply to the contained structure is shut off; thus, an emergency operation (hernioplasty) is often mandatory.

The management of strangulated groin hernias with any technique other than the “gold standard” tension-free technique would leave patients at a higher risk of recurrence necessitating a second operation to deal with this recurrence, should it occur, highlights the benefits of the Lichtenstein tension-free repair in the management of strangulated groin hernias³ but in our randomized trial comparing the Lichtenstein hernia repair with an open preperitoneal approach, some significant advantages were found for the open preperitoneal repair technique.

The preperitoneal hernia repair was first reported by Annandale and subsequently modified by Nyhus.⁴ According to the Nyhus technique, the transverses arch is approximated to the iliopubic tract with interrupted polypropylene sutures and then these initial sutures are placed down to Cooper’s ligament to close the femoral canal, preventing potential recurrences in this area. The reported benefits of the preperitoneal approach are the ease of exposing the hernial defects, which also allows an accurate identification of the vascular structures,⁵ the possibility to discover additional hernias not detected on the initial physical examination, and in cases of previous inguinal hernia corrections, the area is free of the adhesions usually encountered when another inguinal approach is used. Moreover, the preperitoneal approach allowed proximal control of incarcerated or strangulated viscera, thus avoiding excessive manipulation of gangrenous or necrotic intestine. It provides a ready access to the peritoneal cavity with easy delivery and inspection of herniated bowel, obviating any need for celiotomy if bowel resection is necessary.⁶

The first of the few papers about the synthetic prosthesis implantation during strangulated hernia repairs was published by Pans et al., who described the results of the treatment of 35 patients. They showed that the preperitoneal prosthesis implantation is safe, even when necrotic intestine or omentum was resected.⁷ Similar conclusions were presented in Henry’s study,⁸ and those findings were confirmed by the published results of the mesh plug and patch technique. Leibl et al.¹¹ reported the repair of 194 incarcerated hernias using the transperitoneal approach, with postoperative morbidity of 2.8% and only one recurrence after 26 months.^{9,10} These excellent results further strengthen the arguments for the use of tension-free repair in the management of complicated inguinal hernias.

The Lichtenstein procedure is simple and safe and achieves all the goals of modern surgery, such as more comfortable postoperative course and rapid return to unrestricted activities with a recurrence rate of virtually zero (0.1% from early operations). It also avoids the need for general anesthesia and invasion of the peritoneal or preperitoneal spaces and

their associated complications. Lichtenstein herniorraphy is the most applied operation in the hernia surgery. According to Wysocki et al.,⁹ this operation of Lichtenstein is useful and safe in strangulated hernia and also there haven't been observed any differences in rate of local or systemic infections. However, we should say that it has got some defects in case of emergency repair. In our study, during Lichtenstein operation we have confronted some hardship of release and exploration in the intestinal system.

In our opinion, preperitoneal repair represented the best solution in strangulated hernia for different reasons. In general, preperitoneal repair provides a wide vision of the inguinal, crural, and spigelian regions. The dissection of this space enables the positioning of a wide mesh that repairs the entire region with less risk of recurrence. The peritoneum also isolates the peritoneal cavity from the mesh with less risk of contamination.

In conclusion, preperitoneal hernia repair with polypropylene mesh is safe, effective and practical; the simultaneous approach gave excellent results with no significant increase in operative duration or additional complications. Further prospective research is needed to rigorously evaluate the comparative advantages of preperitoneal mesh repair in relation to other repair methods.

Conflict of interest

We haven't got any conflicts of interest.

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We haven't got any source.

Ethical approval

We have got local ethic approval.

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